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TEXTBOOK ILLUSTRATIONS: A CROSS-CULTURAL STUDY AND ITS IMPLICATIONS FOR TEACHERS OF LANGUAGE MINORITY STUDENTS

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INTRODUCTION

This paper reports on a study which seeks to discover whether textbook illustrations are common across languages and cultures and to discover the common graphic types and forms which exist in textbooks across languages. The main purpose is to inform teachers, particularly secondary school teachers and curriculum developers, of the types of graphics which are likely to facilitate learning across cultures. "Knowledge of what the illustrations in textbooks are like and how they are used could serve to guide researchers and theoreticians to important questions of practical relevance" (Evans, Watson, & Willows, 1987, p. 86). This knowledge could also help teachers to provide means for language minority or English as a second language (ESL) students to understand content knowledge that is written or taught in English.

THEORETICAL BACKGROUND

The underlying assumption of the study is that ESL students may take as long as seven or eight years (Cummins, 1984; Collier, 1987) to reach proficiency in academic language comparable to their English-speaking peers. This means that ESL students are denied equal opportunity to acquire content knowledge in schools in North America because content-area subject disciplines are presented in English. What can teachers do to enable ESL students to learn content-area knowledge while they are still in the process of acquiring English language proficiency?

According to schema theory (Bartlett, 1932; Carrell, 1983), comprehending a text, either spoken or written, is an interactive process between the reader/listener's background knowledge and the text. Background knowledge is previously acquired knowledge, and "the previously acquired knowledge structures ... [or] schemata" (Carrell & Eisterhold, 1988, p. 76) represent the sum of what a learner knows about a topic, both formal schemata, i.e., the background knowledge of organizational structure of the text and content schemata, i.e., knowledge of a particular area (Carrell, 1983), acquired both in the learner's first language (L1) and in English. Comprehension of a text requires learners to be able to relate the text to their own formal and content schemata. When immigrant students enter school at the secondary level in an English-speaking country, most of them will have already acquired a quantity of schemata in their L1. If teachers can use these schemata, they may be able to enhance immigrant students' comprehension of content knowledge. Can teachers whose medium of instruction is English activate ESL students' prior knowledge acquired in their L1?

In terms of social semiotics (Hodge & Kress, 1988), everything in a culture (taken in the broadest sense of the term) can be seen as a form of communication which can be understood on the basis of a common set of fundamental rules or principles. In other words, this set of rules is specific to and characteristic of a specific culture, e.g., gamblers or casino-patrons, ESL teachers. People who perform acts of communication in a cultural context assume that the other party understands the same set of rules and principles.

Communication acts can be performed in verbal language as well as nonverbal language and visual forms. Defined thus, communication acts are not necessarily language specific; they can be understood across languages. We can then assume that communication acts or semiotic activities within the same culture, e.g., the culture of intermediate level social studies textbooks, may be performed successfully across linguistic groups, e.g., English speaking Canadians and Chinese-speaking Hong Kong students. If visual and nonverbal semiotic activities within the same culture i.e., intermediate social studies textbooks, are understood across languages, teachers and ESL students can take advantage of illustrations and graphics in instructional materials to elicit students' memory schemata and enhance student learning. One of the aims of this study is to discover whether intermediate social studies textbook illustrations are common across languages, i.e., whether or not similar graphic forms, conventions, and functions are found in textbooks from different linguistic areas. To address the issue I conducted a two-part study of social studies textbooks across different languages.

METHOD

Part One of the study examined social studies textbooks at the form one/intermediate/grade seven level across different languages-Chinese (Hong Kong), Japanese (Japan), and Spanish (Mexico)-referred to in the rest of this paper as the Hong Kong, Japanese, and Mexican textbooks respectively. Part Two compared one of the non-Canadian textbooks to a Canadian grade seven social studies textbook. The criteria for the selection of textbooks were accessibility, grade level, subject area, and wide adoption. The illustrations were counted, classified according to three theoretical frameworks or models, and analyzed.

SELECTION OF TEXTBOOKS AND CONSTRUCTS

In the first part of the study, I examined the illustrations of one Hong Kong, one Japanese, and one Mexican textbook in terms of quantity and form, and two other Hong Kong, two other Japanese, and one other Mexican textbook at the same level for examples of common forms (see Table 1). In the second part, I compared the illustrations in one of the Hong Kong textbooks and one Canadian textbook (see Table 1) in terms of (a) quantity, (b) form, (c) clarity of reference

Table 1. Textbooks Examined

Country/ City	Level Subject Area	Title of Book	Examined For		
			Quantity & Form	Common Graphic Forms	Function
Hong Kong	Form 1 History	New Edition Chinese History Book 1 (1990)	x	x	x
	Social Studies			x	

	(SS) History	Hong Kong Today Book 1 (1990) World History Book 1 (1990)		x	
Japanese	Intermediate SS SS SS SS	Intermediate Socials - SS (1988) Intermediate Socials - Geography (1988) Intermediate Socials - History (1988)	x	x x x	
Mexican	Sec 1 SS Grade 7 SS	Ciencias sociales uno (1986) Primo grado sep Ciencias sociales (1986)	x	x x	
Canadian	Grade 7 SS	Other Places, Other Times	x		x

to illustrations, i.e., whether or not the illustrations are directly referred to (Hunter, Crismore, & Pearson, 1987), and (d) functions of the illustrations in relation to the text. The instruments used for data collection are described in the next subsection.

INSTRUMENTS

Representational/Nonrepresentational pictures

To compare the forms of the illustrations, I employed Levie and Lentz's (1982) categorization of illustrations into representational pictures and nonrepresentational pictures. According to the authors of the categorization, representational pictures are "ordinary drawings and photographs that show what things look

like" (Levie & Lentz, 1982, p. 214). Nonrepresentational pictures, on the other hand, include maps, diagrams which "depict the organization and structure of the key concepts of a content area" (Levie & Lentz, 1982, p. 215), and graphic organizers which are like diagrams but are "a type of advance organizer designed to activate the learner's relevant prior knowledge" (Levie & Lentz, 1982, p. 215).

The Knowledge Framework

Another framework used for classifying illustrations was the Knowledge Framework (Mohan, 1986), a conceptual framework for integrating language and content. Mohan (1986) suggests that certain knowledge structures are fundamental across the curriculum. They include classification, principles, evaluation, description, temporal sequence, and choice/decision making. We use the same knowledge structure when we classify imports and exports in Social Studies and when we classify flowering and nonflowering plants in Science. Each knowledge structure has distinct linguistic features which set it apart structurally from others. Mohan's framework is similar to Meyer's (1985) classification of text into rhetorical patterns or top-level text structures. They are different in that knowledge structures are based on semantic relations while text structures are determined by the sequential patterns of discourse. Undoubtedly, there are "significant differences between languages in their rhetorical structure" (Kaplan, 1987, p. 10). However knowledge structures are built from semantic relations and are not uniquely textual. If they are built on semantic relations, they can exist in the head as thought patterns, in textual materials as oral or written discourse, and in graphic and semiotic form. Mohan (1986) has shown that since classification or description or sequence is the same process regardless of content area, knowledge structures are common across content areas, and that graphic representations of each knowledge structure are also common across content areas. Certain graphic forms are typically used to represent each knowledge structure (Early & Tang, 1991) or conceptual relationship (Johnson, 1989) across the curriculum. This framework was thus chosen for this study to learn whether graphic representations in social studies textbooks are common across languages.

Functions

Function is defined as the role the visual display plays in relation to the text it accompanies. To compare the functions of the illustrations of the books, I classified them into five categories: to embellish, to reinforce, to elaborate, to summarize, and to compare (Hunter et al., 1987). The authors of the model were able to validate, use, and find examples of these five categories in their studies of social studies textbooks and basal readers (Hunter et al., 1987).

Data Analysis

Data collected were statistically analyzed using a computer statistics analysis system (SAS, 1985). Two-way Chi-square (X^2) tests (Shavelson, 1981) were employed to determine whether the quantities of illustrations in textbooks across languages were different from or were related to one another.

FINDINGS OF THE STUDY

Part I

The first part of the study which examined the quantity and form of textbook illustrations across three languages yielded the following results:

1. Social studies textbooks are highly illustrated, but the Hong Kong and Japanese texts have a higher

percentage of graphics than the Mexican text.

Results showed that all three textbooks are highly illustrated (see Table 2) and that there is a high percentage of colored pictures. Authors seem to assume that to people "living in a culture defined by the visual" (Woodward, 1989), textbooks are not attractive without colorful illustrations. Ninety-four percent of the pages in the Hong Kong book, 94% in the Japanese, and 84% in the Mexican one are illustrated (see Table 2). Visual inspection shows that the Hong Kong and Japanese textbooks have a higher percentage of illustrations than the Mexican one although the difference in percentage of illustrated pages among the three books is not significant at 0.05 level ($X^2 = 7.131$, $df = 4$). However, examination of the illustrations also showed that in terms of the quality, clarity, color, and size of the illustrations, the Hong Kong and Japanese books are superior to the Mexican books. Many factors may contribute to this difference, for example, the cost of printing, the competitiveness of textbooks, the level of development of the country or city using the book, or the type of school-private or public-for which the textbook is written. These factors are not investigated in this study.

Table 2. Quantity of Illustrations

	Japan	Mexico	HK	Canada
Number of pages	333	253	176	322
Number of pages with illustrations	314	213	167	229
Graphic percentage	94%	84%	94%	71%
Number of pages without illustrations	19	40	9	93
Graphic percentage	6%	16%	6%	29%

2. The illustrations are mostly representational pictures.

Analyzed according to graphic forms, the books are similar (see Table 3) in that most of the illustrations are representational pictures (Levie & Lentz, 1982): 77% in the Hong Kong, 72% in the Japanese, and 69% in the Mexican. However, statistical analysis shows that the difference in the percentage of representational versus nonrepresentational pictures is marginally significant at the 0.05 level ($x^2 = 6.125$, $df = 2$). Among the nonrepresentational pictures, maps occur most frequently. They take up 11% in the Hong Kong, 14% in the Japanese, and 12.5% in the Mexican texts. There are a few diagrams and graphic organizers in each.

Table 3. Comparison of Graphic Forms: Representational vs. Nonrepresentational Pictures

Graphic Forms	Japan	Mexico	HK	Canada
Representational	n 413 % 72%	n 226 % 69%	n 302 % 77%	n 205 % 73%

Total Non Representational	n 163 % 28%	n 101 % 31%	n 90 % 23%	n 76 % 27%
Map	n 83 % 14%	n 41 % 12.5%	n 43 % 11%	n 52 % 18.5%
Diagram	n 50 % 9%	n 49 % 12%	n 27 % 7%	n 7 % 2.5%
Graphic Organizer	n 30 % 5%	n 11 % 3%	n 20 % 5%	n 17 % 6%

n - number of illustrations

% - percentage of total number of illustrations in book

3. Analyzed according to the Knowledge Framework, all the illustrations are graphic representations of classification, description, and sequence.

A comparison of the graphic representations of the three books reveals (see Table 4) that in all the textbooks examined, the bulk of the illustrations (89% in the Hong Kong, 91% in the Japanese, and 94% in the Mexican) are graphic representations of description. All illustrations fall into the same three of the six categories, namely, description, classification, and sequence, the highest percentage being in the description category (Mohan, 1986). In terms of the percentage of illustrations of each category as measured by the Knowledge Framework, the books are remarkably similar. Statistical analysis shows that the difference is insignificant at the 0.05 level ($X^2 = 7.131$, $df = 4$). This finding indicates that authors of illustrations from different languages and cultures use the same graphic forms and, possibly, the same graphic conventions to represent the same knowledge structures. This point is further explored in the next section.

Table 4. Comparison of Illustrations According to the Knowledge Framework

Classification					Principles					Evaluation
n	JAP 20	MEX 18	HK 17	CAN 4						
%	3%	5%	4%	1.5%						
n	JAP 521	MEX 311	HK 347	CAN 259	n	JAP 35	MEX 11	HK 28	CAN 18	
%	91%	94%	89%	92%	%	6%	1%	7.5%	6.5%	
Description					Sequence					Choice

- n - number of illustrations
- % - percentage of total number of illustrations in the book
- JAP - Japanese textbook
- MEX - Mexican textbook
- HK - Hong Kong textbook
- CAN - Canadian textbook

4. *Authors of graphics appear to use similar graphic forms.*

Table 5 shows that authors from different cultures appear to use the same graphic forms to illustrate social studies textbooks.

The most common ones are photographs, pictures, maps, and plans. Other graphic forms which occur frequently are trees, webs, tables, graphs, time lines, and cycles. Some of these forms are identical, e.g., the same web is used to show the functions of the United Nations in the Hong Kong and Japanese books, but most of them are variations of the same general form. For example, a web can be a number of words, pictures, or symbols in slots arranged in the form of a web. A time line can be a number of words joined together by arrows, or it can be a series of colorful pictures arranged in chronological order. In a large number of cases, the same graphic forms represent the same knowledge structures (see Table 5). Some are simple classification trees or time lines. Others, however, represent more than one knowledge structure in the same graphic form. For example, a diagram may show the process of erosion of rocks in a desert (sequence) and at the same time the factors which contribute to the process (cause-effect), thus becoming a graphic representation of a sequence of principles.

5. *Authors of illustrations use the same graphic conventions.*

Further examination of the illustrations revealed that authors use the same graphic conventions-a title, headings, and labels-which can help us to determine the knowledge structure they represent. They follow the top-down and left-right conventions. The arrow, a device used in all three sets of textbooks, is used in each to show different kinds of relationships: temporal (is followed by), causal (is caused by), spatial (goes to, or is brought to), and operational (has the function of). Most, but not all, of the illustrations are accompanied by a caption.

We can conclude from the above findings that it is possible for many immigrant and ESL students who enter a secondary school in Canada to have been exposed to a considerable quantity of graphics and to more or less the same graphic forms and graphic conventions. However, are they similar to the graphics found in instructional materials in Canadian schools? Moreover, can teachers take advantage of the graphics and illustrations found in Canadian textbooks to facilitate ESL student learning?

PART II

The second part of the study compared the illustrations of a textbook used in Hong Kong and a textbook widely adopted in schools in British Columbia. The two books were selected because they are of comparable grade level and subject area, both are widely adopted in their respective countries, and both have been recently published. The study yielded the following results:

Table 5. *Graphic Forms Commonly Found in Social Studies Textbooks Across Languages*

Graphic form	Knowledge Structures	Example		
		Hong Kong	Japanese	Mexican
Picture/Photo	D	Photographs of artifacts	Photographs of artifacts	Photographs of artifacts
Map/ Plan	C1 D	Political map Street map	Political map Street map	Political map
Tree	C1	Structure of government department; commerce and industrial development of Hong Kong	Structure of government different kinds of industry	Organization of federal government; classification of industry
Web	C1	The functions of UN; different factors affecting government policy	The organization of UN; the sources of the ingredients of a bowl of noodles	Organization of UN
Pie	C1	Imports of Hong Kong	Imports and exports of Korea	Classification of population by economic activity
Table/Chart	C1 D	Principal reforms of Napoleon; comparison of the area, population and countries of the continents in the southern hemisphere; comparison of population growth in different towns in the '70s, '80s, '90's; contrasts of Berbers and Bedouins	Climatic regions of the world; comparison of the death rate in different countries in WWI/WWII; comparison of capitalist and socialist economy	Principal international organizations in Europe; comparison of the area, population density and % of urban and rural population in different geographic locations in Mexico
Bar graph	D	Comparison of male and female population by age group; population increase in Hong	Comparison of male and female population by age group; working class population	Comparison of male and female population by age group; population increase in the

		kong from 1911 to 1987	increase since 1955	Republic of Mexico from 1895 1980
Line graph	D	Comparison of birth and death rate over time; population increase in Hong Kong from 1911 1991	Comparison of imports and exports over time; fuel import from 1971-1987	Comparison of birth and death rate over time; population increase from 1900-1980
Time chart Time line	S P	Zhou Dynasty: major events; relationship between production and consumer markets; the process of erosion and factors affecting the process	Major events between 1915 and 1930; the production and production increase process	Cronologia constitutional; problem solution process
Cycle	S P	The change of seasons in the northern hemisphere	The economic cycle	The movement of the earth and the seasons
Diagram	C1	Classification of vegetation by altitude	Classification of vegetation by latitude and altitude	

1. The Hong Kong textbook has more illustrations than the Canadian textbook.

In terms of quantity of illustrations, the Hong Kong book (94%) has a higher percentage than the Canadian book (71%) (see Table 2), and the difference is significant at the 0.05 level ($X^2 = 39.473$, $df = 1$). However, the cause is again not investigated. It is also noted that emphasis on graphics is mentioned as one of the objectives in the Hong Kong book. However, the presence of illustrations does not necessarily mean that students interact with the illustrations. Indeed, in a naturalistic study of two classrooms in Vancouver, it was discovered that students did not pay attention to textbook illustrations unless they were explicitly instructed in the text to refer to the graphic form (Tang, 1991). Do these two textbooks make directive reference (Hunter et al., 1987) to illustrations?

2. There is a lack of directive reference to the illustrations in both books.

Examination of the two textbooks showed that one of the characteristics of both books is the lack of directive reference to the illustrations. A large number of them are mentioned on the same page, and some of them are mentioned on the previous or following page, but the text makes directive reference (Hunter et al.,

1987) to only a small number of them. Only eight illustrations, two representational pictures, two maps, and four charts in the Canadian book and six charts in the Hong Kong book are directly referred to.

3. In both textbooks, the illustrations are mostly representational pictures.

A large percentage of the illustrations in both textbooks is representational pictures (see Table 3). Statistical analysis shows that the difference in the proportion of representational versus nonrepresentational pictures in the two textbooks is insignificant at the 0.05 level ($X^2 = 1.471$, $df = 1$).

4. All illustrations fall into the same three knowledge structures (Mohan, 1986).

A comparison of the graphic representations of the two textbooks revealed (see Table 4) that all illustrations fall into the same three of the six knowledge structures (Mohan, 1986), namely, description, classification, and sequence, the highest percentage being in the description category (92% in the Canadian book, 89% in the Hong Kong). In terms of the percentage of illustrations of each category as measured by the Knowledge Framework, the books are remarkably alike. Statistical analysis shows that the difference is insignificant at the 0.05 level ($X^2 = 4.824$, $df = 2$).

5. The functions of the illustrations in the two books are to a large extent similar.

Analyzed according to categorization used by Hunter et al. (1987) to look at the functions of the illustrations in relation to the text they accompany, the two books are significantly different at the 0.05 level ($X^2 = 15.731$, $df = 4$). However, they are similar in that a large proportion of the illustrations in both the textbooks (60.5% in the Canadian book and 61.5% in the Hong Kong) reinforce the text, and a fairly large number of them (31.5% in the Canadian and 23.5% in the Hong Kong) are placed in the embellishment category because they are not mentioned in the text (see Table 6).

Table 6. Comparison of Graphic Functions

Graphic Functions	Quantity in Canadian Book		Quantity in Chinese Book	
	n	%	n	%
Embellishment (illustrations not discussed in text)	88	31.5%	94	24%
	170	60.5%	241	61.5%
Reinforcement (information in the illustrations is repeated in text)	7	2.5%	25	6%
	13	4.5%	32	8.5%
Elaboration (illustrations not only	3	1%	0	0%

<p>repeat but also add new)</p> <p>Summarizing (illustrations provide a sketchy overview of a portion of text)</p> <p>Comparison (illustrations included for readers to compare or contrast with earlier versions)</p>				
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n - number of illustrations

% - percentage of total number of illustrations in the book

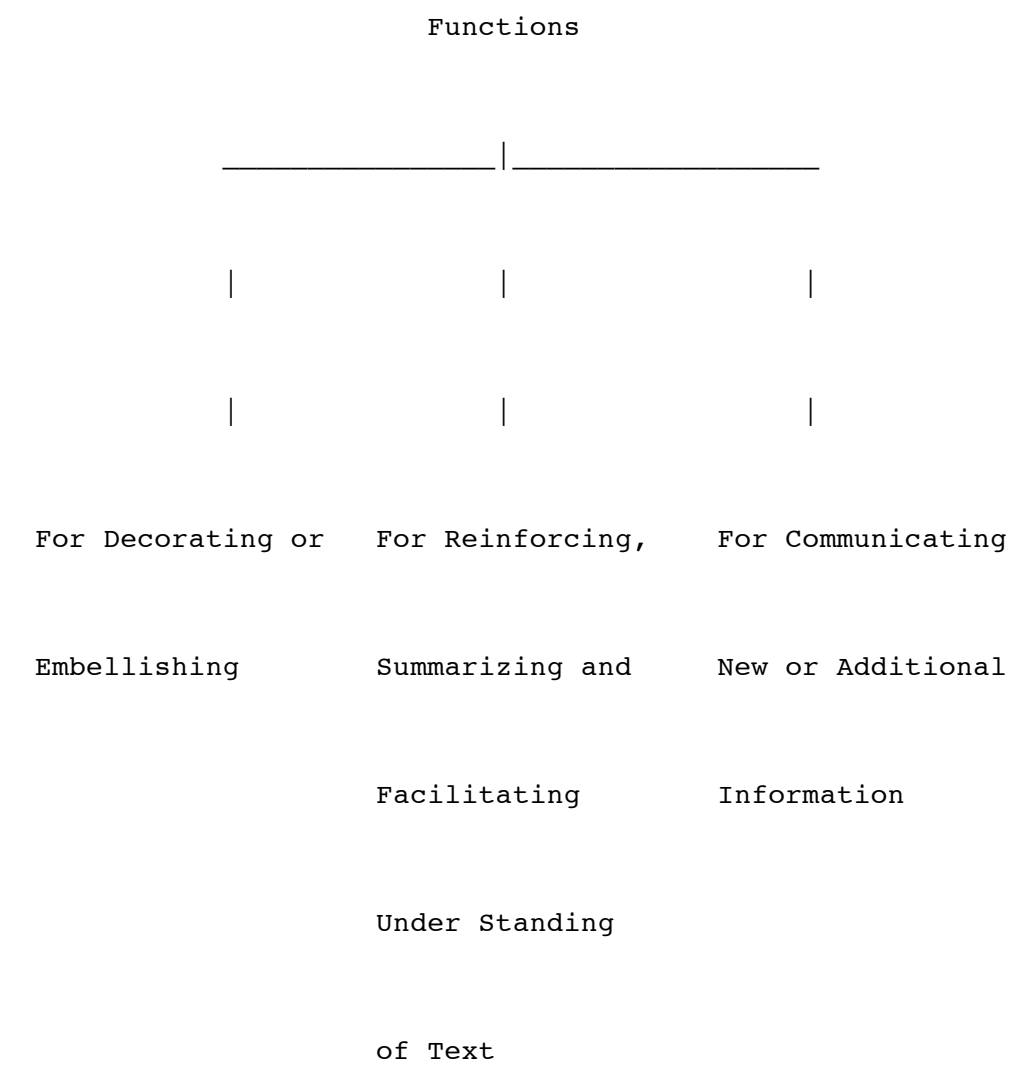
6. Most illustrations which appear to be included for embellishment are accompanied by lengthy captions.

One characteristic merits attention. In both books, most of the illustrations which appear to be included for embellishment (Hunter et al., 1987) are accompanied by lengthy and interesting captions which give relevant information, but they are not directly discussed in the text. The illustrations may have been included to entice readers, but they also give additional information. Whether they elaborate (Hunter et al., 1987) the text or not, the illustrations accompanied by lengthy captions communicate knowledge or information in their own right. In the Canadian book, many of these captions are followed by a question which requires students to define, compare, describe, sequence, state cause and effect, evaluate, or choose (Mohan, 1986). As Woodward (1989) maintains, illustrations "accompanied by captions that provide additional information or raise questions are likely to be the most useful in teaching about a topic, event, or concept" (p. 102). They are not included as an aid to facilitate understanding of the text. They are there instead of the text, and the caption is the aid which facilitates understanding of the knowledge communicated through the graphic form. The book recognizes two alternative methods of communicating knowledge: text and graphic form, and they are often used in different parts of the chapter to present different information.

7. The functions of textbook illustrations can, perhaps, be classified into three categories.

Viewed from a cross-cultural perspective, we may be able to redefine the functions of illustrations into three categories, namely, (a) for decorating (Levin, Anglin, & Carney, 1987) or embellishing the book, (Hunter et al., 1987); (b) for reinforcing, summarizing, and facilitating understanding of text; and (c) for communicating knowledge in their own right and giving additional information (see Figure 1).

Figure 1. Functions of Illustrations: A Cross-Cultural Perspective.



CONCLUSION: IMPLICATIONS FOR TEACHERS

Findings of the study indicate that graphics are, to a large extent, common across languages in intermediate level social studies textbooks, implying that ESL teachers can, and should, make use of graphics and textbook illustrations to enhance language minority students' learning of content-area subject matter presented in English. The following summarizes the findings and discusses ways in which ESL and content-area teachers can use graphics to help language minority students learn content knowledge while they are in the process of acquiring English proficiency.

- 1. Social studies textbooks used in other countries, e.g., in Hong Kong and Japan, are highly illustrated

which indicates that students from those countries may have been exposed to large quantities of graphics in their L1 situations. Thus, it would seem that those students rely on graphics to learn content knowledge. It is true that whether students do or do not rely on graphics, and whether they are graphically literate, depends on what teachers and students do with graphics in the classroom. Nevertheless, it appears that graphics constitute some of the prior knowledge structures or schemata of these students. According to schema theory (Carrell, 1988), learning can take place only when the student's prior knowledge is activated. If this is true, it is possible that we can make use of graphics to elicit students' prior knowledge schemata acquired in their L1.

2. Authors of illustrations use the same graphic forms across languages. Pictures, sometimes the exact same ones, were found in the textbooks I examined. Classification trees, webs, and comparison bar graphs representing not only the same knowledge structure, but the exact same topic as well, occur. They follow the same graphic conventions with slight variations. This finding suggests that graphics and knowledge structures are common across cultures and that graphics may be able to help ESL students to understand content knowledge.

3. Illustrations are often not directly referred to in some textbooks (It should be pointed out, however, that clarity of reference was studied in only two textbooks, one written in English and the other in Chinese.) suggesting that students might skip over them if they are left to read the text on their own. Teachers should recognize this and help students to form the habit of referring to illustrations in textbooks and instructional materials regardless of whether they are directly referred to in the text. They should draw students' attention to the illustrations, discuss examples from textbooks and from everyday reading, and give students guidance on how to read text and illustrations. As Downey (1980) points out, "except in the most superficial way, pictures do not speak for themselves. Most of the information contained in any picture has to be deliberately and patiently extracted from it" (p. 93). Teachers have to discuss the illustrations, captions, and accompanying questions with students and give specific instructions and practice on how to read, interpret, and use different kinds of graphics.

4. The Canadian textbook does not have as many illustrations as the non-Canadian, and the difference in the quantity of illustrations between the two textbooks is statistically significant. If this textbook is typical of Canadian social studies textbooks, perhaps teachers should construct graphic materials to supplement the text when graphics do not exist in textbooks. The value of creative graphing in teaching and learning different concepts across the curriculum is well documented in Johnson (1989).

5. If authors from different cultures use the same graphic forms and conventions to illustrate social studies textbooks, teachers can construct their own graphics employing those forms and conventions. They can use trees and webs to show classification and time lines or charts to show sequence. They can use the same graphic conventions, e.g., titles, headings, and labels to show the knowledge structure the graphic form represents. They can use symbols such as arrows to show different kinds of relationships. These conventions need to be pointed out to the students, and tasks have to be set to ensure that they pay attention to and interact with the graphics, e.g., reading and interpreting graphics and constructing graphics as a form of communication.

6. The findings suggest that certain graphic functions are common across cultures, e.g., for decorating, reinforcing, and summarizing the text, and for communicating additional knowledge. Teachers should be able to recognize the different levels and functions of textbook illustrations, identify the function of each, make use of the illustrations, and enable students to do the same. Even if certain illustrations appear to serve no better purpose than to embellish, teachers should not ignore them but refer students to them, discuss them

and their captions, and set tasks for their use.

If, as the findings suggest, illustrations are common across languages and cultures, perhaps they can activate students' memory schemata of knowledge learned in their L1 and facilitate their learning of new knowledge presented in another language. The question has yet to be explored. We have yet to discover students' graphic literacy-i.e., if graphics found in students' L1 textbooks are more easily understood and more facilitative of learning-to find out whether students interact with textbook illustrations in L1 learning situations, to identify the graphic forms which facilitate learning, to determine how individual students construct meaning from graphics, and to establish whether graphics serve to elicit prior knowledge. If these questions can be answered and the findings are positive we may have found a way to provide more equitable opportunities for language minority or ESL students to access content knowledge.

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